SITE MANAGEMENT PLAN
WASHINGTON COUNTY LEAD DISTRICT – POTOSI, OLD MINES AND RICHWWOODS SITES
WASHINGTON COUNTY, MISSOURI
CERCLIS ID #: MON000705023, MON000705027 and MON00705032
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Background

The Washington County Lead District Potosi, Old Mines, and Richwoods Sites (Sites) encompass an approximately 180 square mile region in northeast Washington County in which extensive lead and barite mining, milling, and smelting activities were conducted for over 200 years. The Washington County Lead District is located in the Old Lead Belt in Missouri.

The Potosi Site includes areas within and surrounding the following towns: Potosi, Mineral Point, Springtown, Cadet, Summit, Bates Creek Camp, Happy Hollow and Shibboleth. The Old Mines Site includes areas within and surrounding: Old Mines, Bellefontaine, Fertile, Latty, Bliss, Cruise Mill, Cannon Mines, Racola and Mud Town. The Richwoods Site consists primarily of the area surrounding the community of Richwoods.

The historical mining operations at the Sites were very similar with remnants of past mining operations such as strip mines, mineshafts, mine dumps, tailings areas, tailings ponds, and associated dams present throughout. Soil, groundwater, surface water and sediment contamination by arsenic, barium, cadmium, and lead at the Sites are most likely the result of lead and barite mining, milling, and smelting.

The geology in Washington County is Precambrian to Quaternary in age. The Upper Cambrian sequence of carbonate deposits in Washington County are comprised of six formations; Lamotte Sandstone, Bonne Terre Formation, Davis Formation, Derby-Doe Run Dolomite, Potosi Dolomite, and Eminence Dolomite. These Upper Cambrian deposit are overlain by two Lower Ordovician strata; the Gasconade Dolomite and the Roubidoux Formation.

Most lead mineralization in the Washington County area occurs within the lower part of the Bonne Terre Dolomite on exposed Precambrian topographic highs, generally within a few hundred feet of the boundary where the underlying Lamotte sandstone pinches out. In a few locations, mineralization extends downward into the upper part of the Lamotte Sandstone. Lead ore occurs as deposits of lead and other metallic minerals that have replaced dolomite crystals in portions of the Bonne Terre Formation.

Only a few minerals are found with barite; sulfides, oxides, carbonate, silicates and sulfates. The usual mineral association is quartz, pyrite or marcasite, limonite, galena, sphalerite and barite. There are three common modes of occurrence of barite in Washington County; veins, disseminated deposits, and residual deposits.

Washington County has two major regional aquifers, the St. Francois and Ozark, separated by the St. Francois confining unit. The Davis Formation and the Derby-Doe Run Dolomite are approximately 300 feet thick and comprise the strata which act as a barrier separating the two aquifers. The Lamotte Sandstone and Bonne Terre Formation have a combined thickness that varies from 0 to 800 feet and are the geologic units of the semi-confined St. Francois aquifer. The Potosi, Eminence, Gasconade, and Roubidoux Formations comprise the unconfined Ozark aquifer and have a total thickness of approximately 900 feet. Water yields to wells in the St. Francois aquifer vary from 10 to 100 gallons per minute. The Ozark aquifer typically yields water 50 to 1,000 gallons per minute depending on the number of formations intercepted by the well.

Previous Investigations and Activities

Potosi Site

Between 2004 and 2006, MDNR and EPA completed an initial screening of public lands evaluation, Pre-CERCLIS screening assessment, abbreviated PA, and combined SI/RA at the Potosi Area Site. In October 2005, the EPA formally approved commencing a TCRA at the Site. From October 2006 to March 2010, EPA completed over 200 TCRA. Over 1,600 properties have been sampled with an estimated 870 properties remaining with surface soil lead concentrations exceeding 400 ppm. The Site was added to the NPL on March 19, 2008.

Old Mines Site

Between 2005 and 2006, MDNR and EPA conducted a Pre-CERCLIS screening assessment, PA/SI, and an RSE at the Old Mines Site. In December 2005, the EPA formally approved commencing a TCRA at the Site. Approximately 980 properties have been sampled and EPA has completed 60 TCRA. An estimated 396 properties remain with surface soil lead concentrations exceeding 400 ppm. The Site was added to the NPL on March 19, 2008.

Richwoods Site

Between 2005 and 2006, MDNR and EPA conducted a Pre-CERCLIS screening assessment, PA/SI, and an RSE at the Richwoods site. In December 2005, the EPA formally approved commencing a TCRA at the Site. From October 2006 to September 2009, the EPA excavated, removed, and replaced lead-contaminated soils and/or wastes from 19 properties. To date, over 370 properties have been sampled with an estimated 79 properties remaining with surface soil lead concentrations exceeding 400 ppm. The site was added to the NPL on March 19, 2008.

The RI/FS Report for the Sites were issued in February and July 2010, respectively. The RODs for OU-1 (residential yards) were final September 29, 2011. The following table presents a summary of OU-1 activities:

Residential Yard Soils	Properties Sampled	TCRA Completed	℮ Properties Remaining ≥ 400 ppm Pb	Known Properties ≥400 ppm Pb	Total ℮ Properties ≥400 ppm Pb
Potosi	1,685	202	292	578	870
Old Mines	980	60	166	230	396
Richwoods	370	19	32	47	79
Total	**3,035**	**281**	**490**	**855**	**1,345**

Groundwater, OU-2

Groundwater samples were collected at the Sites by EPA and MDNR during previous investigations from 2005 through 2008. A total of 2,603 groundwater samples were identified in EPA's database for the WCLD sites including 1,102 groundwater samples collected from the Potosi site, 395 samples collected from the Richwoods site; and 1,106 samples collected from the Old Mines site. Groundwater samples were analyzed for total and dissolved lead, arsenic, barium, and cadmium. A draft FS was prepared by B&V in February 2010.

Current Actions

The ROD for OU-01 addresses lead in residential soils above 400 ppm. The EPA will complete excavation and removal of surface soil above 400 ppm lead to a depth of 12 inches. If the lead concentrations at the 12 inch depth are at or exceed 1,200 ppm, a visual marker barrier will be placed at the base of excavation. Clean fill and topsoil replacement will follow along with re-vegetation. Excavated soils will be disposed of at the soil repository located at the Indian Creek Mine Tailings Site. HEPA vacuum cleaners will be distributed along with health education packets. Institutional controls will need to be developed to ensure long term effectiveness of the remedy. The following table presents a summary of OU-1 remediation estimates:

RA Category	Potosi	Old Mines	Richwoods	Total
℮ Volume of Soil (cy)	435,000	198,000	39,500	**672,500**
Projected Cost (millions)	$ 21.8	$ 10.2	$ 2.2	**$ 34.2**

Exemption 5: DP

Additional Required Actions

Scaled Site Sketches

Residential soil remediation for OU-1 is anticipated to begin in the spring of 2012. Prior to bidding the remediation work, site sketches of many properties will need to be re-drawn to scale so that contractors may produce more accurate volume-based

estimates. Scaled drawings of residential properties will also assist during excavation work and provides for a level of intuitional control by allowing property owners, utility workers, etc. the ability to easily identify remediated areas and areas where contamination is left at depth. This work will create consistency for quality and type of information recorded on site sketches. The following table presents the cost estimates for re-drawing site sketches:

Site	No. Of Sketches
Potosi	588
Old Mines	256
Richwoods	39
Total	**883**

Exemption 5: DP

Sampling Remaining Properties

An estimated 490 properties have not been sampled at the Sites. It is anticipated that the sampling field work will start before the remedial action start set for the spring of 2012 and would be completed within one year. Access agreements will need to be obtained as part of this work. The table below provides a cost estimate for sampling the remaining properties at the Sites:

Exemption 5: DP

Site	Number Of Properties
Potosi	292
Old Mines	166
Richwoods	32
Total	**490**

Interagency Agreement

Exemption 5: AC/AWP

An Interagency Agreement (IA) with USGS is being formed with the following purpose and scope:

1. Elaborate on the geology and history of mining in the site, with a focus on its relationship to documented residential lead contamination;
2. Determine if barite mining and milling is connected to the residential lead contamination documented throughout the site;
3. Elaborate on the geology/hydrogeology and history of mining in the site, with a focus on its relationship to documented groundwater contamination;
4. List potential sources for groundwater contamination and explain the groundwater contamination pathway; and

5. Provide written explanation of all findings and participate in discussions with potentially responsible parties (PRPs).

These items have been divided into two phases (items 1 and 2 in phase 1 with items 3 to 5 in phase 2) and it is anticipated to require two years to complete. Exemption 5: DP

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